

DOCUMENT RESUME

ED 266 578

EC 181 742

AUTHOR Wilson, Sheryl L.; Cleaves, Wallace T.
 TITLE Qualitative Differences in the Structure of Intelligence of Retarded Children.
 PUB DATE Aug 85
 NOTE 13p.; Paper presented at the Convention of the American Psychological Association (Los Angeles, CA, August 23-27, 1985).
 PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)
 EDRS PRICE MF01/PC01 Plus Postage.
 DESCRIPTORS Cognitive Development; Cognitive Processes; Elementary Secondary Education; *Intelligence Differences; Intelligence Quotient; *Mild Mental Retardation

ABSTRACT

To examine whether or not retarded individuals have the same structure of intelligence as normal IQ individuals, test scores from the Wechsler Intelligence Scale for Children-Revised (WISC-R), Reitan's Trail Making Test (TMT), and Beery's Developmental Test of Visual Motor Integration (VMI) for both a mildly retarded and normal IQ population of children were collected. Children were matched for both chronological age (CA), and mental age (MA), resulting in four sets of analyses. It was hypothesized that DQ (freedom from distractibility) from the WISC-R would be highly related to TMT, while PQ (perceptual organization) would be highly related to VMI. Results found similar relationships between the variables, regardless of the matching procedure. DQ significantly predicted the variance in Trails B of the TMT for the retarded sample, but not for the normal IQ sample. Similarly, PQ was significantly related to VMI for the normal IQ sample, but not for the retarded sample. Therefore, it appears there may be a qualitative difference in the structure of intelligence of the retarded child. (CL)

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ED266578

Qualitative Differences in the Structure of Intelligence of Retarded Children

Sheryl L. Wilson

University of Arizona, Tucson

Wallace T. Cleaves

California State University, San Bernardino

Paper presented at the Annual Meeting of the American Psychological
Association, August, 1985, Los Angeles, California

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Qualitative Differences in the Structure of Intelligence of Retarded Children

There is an ongoing controversy concerning whether or not the retarded individual has the same structure of intelligence as the normal IQ individual. Supporters of the similar structure hypothesis rely primarily on Piagetian cognitive tasks which indicate that when neurologically intact retarded individuals are compared with normal IQ individuals of equal mental age (MA), there are no differences (Weisz & Yeates, 1981). Factor analysis studies of the WISC-R conducted by Kaufman (1975), and Van Hagen and Kaufman (1975) have added further support for this position.

Supporters of the difference theory base their position on the belief that the cognitive development of the retarded child differs from that of the normal child's in ways other than mere differences in developmental rate and ceiling (Milgram, 1969). This position further proposes that even when retarded and nonretarded individuals are equated for MA, they will still differ in the cognitive processes they use to reason (Ellis, 1969; Milgram, 1969).

The purpose of this study was to further investigate the question of whether or not there is a qualitative difference in the structure of intelligence of the retarded child. In order to do this, Kaufman's (1975) factor analytic indices as well as VIQ and PIQ from the WISC-R were compared to scores from both Reitan's (1979) Trail Making Tests and Beery's (1982) Developmental Test of Visual Motor Integration (VMI) for both a retarded and normal IQ population of Children. These tests were chosen based on their theoretical overlap in skills and abilities which they measure. That is, DQ and the Trail Making Tests are both purported to measure attentional skills (Kaufman, 1975; Lezak, 1981), while PIQ, PQ and the VMI measure perceptual abilities (Wechsler, 1974; Kaufman, 1975; Beery, 1982). The children were screened in order to exclude any subjects with neurological damage. In addition, two sets of analyses were conducted. First, the two populations were defined solely by IQ level. The retarded children had IQ's ranging from 52-80, while the normal IQ's ranged from 81-120. Then, the retarded

children were matched for MA with the normal IQ children and a new set of analyses were conducted. Because there was very little difference in the pattern of results for the two methods of matching the groups, only the MA-matched results are reported.

Comparisons between Kaufman's (1975) factor analytic indices of the WISC-R, Verbal Comprehension (VQ), Perceptual Organization (PQ), and Freedom from Distractibility (DQ), and Trails B clearly differentiated the two populations. While Trails B correlated with DQ in the MA-retarded group, $r(15) = .700$, $p < .01$ (Table 1), it correlated with PQ in the MA-normal IQ group, $r(15) = .640$, $p < .02$ (Table 2). It therefore appears that while DQ is an attentional measure for the retarded child, it is not for the normal IQ child. The correlation between DQ and Trails B indicates that there is a strong relationship between declining IQ's and poor attentional skills. This is perhaps due to an inability to sequentially shift attention and an inflexibility of concentration. It also seems that as the normal IQ child's attentional skills improve, so does perceptual organization. To further clarify these relationships, hierarchical regression analyses were conducted based on the hypothesized relationships of the tests. It was predicted that the best equation to explain the variance in DQ would be Trails B, Trails A, PQ, VMI, and VQ. As can be seen in Table 3, this equation explained 53 percent of the variance for the retarded group. Also, as predicted, Trails B was the single best predictor of performance on DQ. The results in Table 4 show that although the equation explained 57 percent of the variance, it was PQ which explained a significant proportion of the variance for the normal IQ group.

Similarly, two equations were generated to analyze the variance in Trails B. These were PIQ, VMI, and VIQ, and DQ, PQ, VMI, and VQ. Tables 5 and 6 illustrate that again the two groups were quite different. While the first equation explained only 7 percent of the variance in Trails B for the retarded group, it was able to explain 54 percent of the variance for the normal IQ group. However, the second equation was able to explain 52 percent of the variance in the retarded group, with 49 percent of

the variance explained by DQ alone. In the normal group this equation explained 63 percent of the variance. As can be seen, the major difference between the groups is the single best predictor; for the normal IQ group it is either PIQ or PQ, while for the retarded group it is DQ.

The VMI also appears to aid in discrimination between the two populations. Specifically, the VMI did not yield any significant relationships in the retarded group, however, it was significantly related to PQ for the normal MA group, $r(15) = .642$, $p < .01$ (Table 2). When the hierarchical analyses were conducted, it was found that PIQ, Trails A, Trails B, and VIQ could explain only 29 percent of the variance of VMI in the retarded group, but explained 57 percent of the variance in the normal group, with the predicted significant relationship between VMI and PIQ present (Tables 7 and 8). The second equation, PQ, Trials A, Trails B, DQ, and VMI, increased the amount of variance explained for the retarded group to 33 percent (Table 7) and in the normal group to 65 percent (Table 8). Again, the hypothesized relationship was found between PQ and VMI only for the normal group. This would indicate that the VMI does in fact measure visual-perceptual skills in normal IQ children. However, it does not appear to do so within a population of retarded children.

In conclusion, it appears that there may be a qualitative difference in the structure of intelligence for normal and retarded children and that the factors PQ and DQ are measuring different skills in the two populations. This implies that great caution needs to be employed when analyzing the test profiles of retarded children, especially when the normative samples are based on normal IQ individuals. If the tests are actually tapping different skills and deficits, then interpretation of tests such as the WISC-R must seriously consider the IQ level of the individual child under consideration. The general trend to think of mentally retarded children as simply developmentally depressed may no longer be a viable model upon which to base test interpretations.

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Table 1

Correlation Matrix for Retarded IQ, MA-Matched

	PIQ	VQ	PQ	DQ	TrailsA	TrailsB	VMI
VIQ	-.07	.93***	.16	.02	-.17	-.03	.50
PIQ	—	-.19	.59*	.34	.16	.26	.11
VQ		—	.06	-.16	-.27	-.21	.30
PQ			—	-.14	-.13	-.23	.37
DQ				—	.30	.70**	.20
TrailsA					—	.35	.18
TrailsB						—	.05
VMI							—

Table 2

Correlation Matrix for Normal IQ, MA-Matched

	PIQ	VQ	PQ	DQ	TrailsA	TrailsB	VMI
VIQ	-.05	.97***	-.08	.26	-.13	-.05	.19
PIQ	—	-.20	.98***	.64	.48	.63*	.62*
VQ		—	-.24	.08	-.18	-.14	.08
PQ			—	.69**	.50	.64*	.64*
DQ				—	.27	.32	.50
TrailsA					—	.68**	.12
TrailsB						—	.10
VMI							—

*p < .02. **p < .01. ***p < .001.

Table 3

Hierarchical Regression Analysis for Retarded IQ, MA-Matched
(Dependent variable = DQ)

Predictor	R	R ²	F _o	p	R ² chg	F _i	p
TrailsB	.70	.49	12.49	.00	.49	12.49	.00
TrailsA	.70	.49	5.84	.02	.00	.07	.80
PQ	.70	.49	3.58	.05	.00	.02	.90
VMI	.73	.53	2.79	.09	.03	.64	.45
VQ	.73	.53	2.04	.17	.00	.76	.79

Table 4

Hierarchical Regression Analysis for Normal IQ, MA-Matched
(Dependent variable = DQ)

Predictor	R	R ²	F _o	p	R ² chg	F _i	p
TrailsB	.32	.10	1.50	.24	.10	1.50	.24
TrailsA	.33	.11	.72	.51	.00	.09	.81
PQ	.70	.49	3.56	.05	.38	8.07	.02
VMI	.70	.49	2.43	.12	.00	.00	.99
VQ	.76	.57	2.40	.12	.08	1.65	.23

F_o = overall F; F_i = incremental F.

Table 5

Hierarchical Regression Analyses for Retarded IQ, MA-Matched
(Dependent variable = TrailsB)

Predictor	R	R ²	F _o	p	R ² chg	F _i	p
PIQ	.26	.07	.94	.35	.07	.94	.35
VMI	.26	.07	.44	.65	.00	.01	.92
VIQ	.26	.07	.27	.84	.00	.01	.91
DQ	.70	.49	12.49	.00	.49	12.49	.00
PQ	.71	.51	6.22	.01	.02	.39	.55
VMI	.71	.51	3.82	.04	.00	.02	.88
VQ	.72	.52	2.68	.09	.01	.15	.71

F_o = overall F; F_i = incremental F.

Table 6

Hierarchical Regression Analyses for Normal IQ, MA-Matched(Dependent variable = TrailsB)

Predictor	R	R ²	F _o	P	R ² chg	F _i	P
PIQ	.63	.40	8.55	.01	.40	8.55	.01
VMI	.73	.53	6.76	.01	.13	3.18	.10
VIQ	.73	.54	4.29	.03	.01	.23	.64
DQ	.32	.10	1.50	.24	.10	1.50	.24
PQ	.66	.43	4.62	.03	.33	8.85	.02
VMI	.76	.58	5.15	.02	.15	3.99	.07
VQ	.79	.63	4.18	.03	.04	1.11	.32

F_o = overall F; F_i = incremental F.

Table 7

Hierarchical Regression Analyses for Retarded IQ, MA-Matched(Dependent variable = VMI)

Predictor	R	R ²	F _o	p	R ² chg	F _i	p
PIQ	.11	.01	.15	.70	.01	.15	.70
TrailsA	.23	.05	.34	.72	.04	.59	.50
TrailsB	.25	.06	.25	.86	.01	.12	.74
VIQ	.54	.29	1.03	.44	.23	3.25	.10
PQ	.37	.14	2.08	.17	.14	2.08	.17
TrailsA	.40	.16	1.11	.36	.02	.25	.62
TrailsB	.44	.20	.90	.47	.04	.55	.47
DQ	.50	.25	.83	.54	.05	.71	.42
VQ	.57	.33	.88	.53	.08	1.07	.33

F_o = overall F; F_i = incremental F.

Table 8

Hierarchical Regression Analyses for Normal IQ, MA-Matched(Dependent variable = VMI)

Predictor	R	R ²	F _O	p	R ² chg	F _i	p
PIQ	.62	.38	8.05	.01	.38	8.05	.01
TrailsA	.65	.42	4.41	.04	.04	.95	.37
TrailsB	.72	.52	3.95	.04	.09	2.21	.17
VIQ	.75	.57	3.30	.06	.05	1.17	.30
PQ	.64	.41	9.13	.01	.41	9.13	.01
TrailsA	.68	.47	5.28	.02	.06	1.01	.29
TrailsB	.76	.57	4.93	.02	.11	2.04	.13
DQ	.76	.57	3.36	.06	.00	.00	.99
VQ	.80	.65	3.28	.06	.07	1.68	.21

F_O = overall F; F_i = incremental F.

Qualitative Differences in the Structure of Intelligence of Retarded Children

There is an ongoing controversy concerning whether or not retarded individuals have the same structure of intelligence as normal IQ individuals. Supporters of similar structure contend when neurologically intact retarded individuals are compared with normal IQ individuals of equal mental age (MA), there are no differences. The difference position believes the cognitive development of retarded children differs from normal children in ways other than mere differences in developmental rate and ceiling.

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